SEEDS Technology Infusion Study

Second SEEDS Public Workshop

Plenary Overview

Agenda

- ❑ **Study Overview**
  - ➢ Purpose
  - ➢ Approach
  - ➢ Schedule
  - ➢ Status

- ❑ **Highlights**
  - ➢ Technology infusion process
  - ➢ Capability needs identification
  - ➢ Breakout Session - SEEDS Vision for 2010
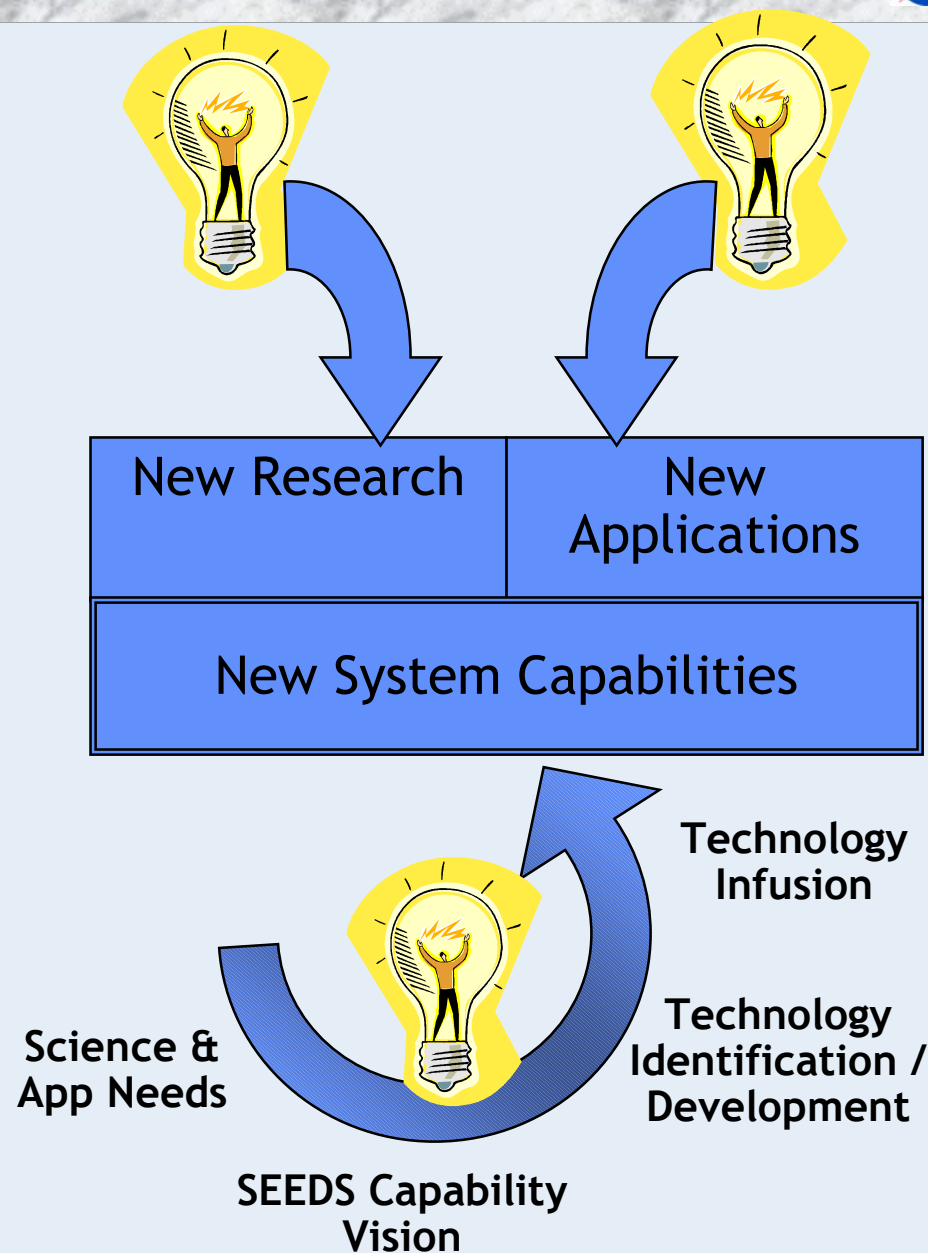
- ❑ **Next Steps**

Study Motivation

- ❑ **ESE science and applications goals for 2010-2025 will challenge existing systems**
  - ➤ Increased accuracy/precision in physical models
  - ➤ Increased demand for near-real-time data
  - ➤ Increasing need to combine different data sources
  - ➤ Continually increasing data volumes

- ❑ **Many questions remain**
  - ➤ What new capabilities are needed?
  - ➤ What new technologies are needed?
  - ➤ What technologies need to be pushed forward?
  - ➤ How will we infuse new technologies into systems?

New Research | New Applications

New System Capabilities

Technology Infusion

Science & App Needs

Technology Identification / Development

SEEDS Capability Vision

SEEDS Technology Infusion Study

Purpose

- **Define processes to infuse new technologies into ESE data systems**

- **Define and conduct community-based processes to identify needed capabilities & technologies**
  - ➢ Facilitate creation of a SEEDS capability vision

- **Determine roles of ESTO AIST and SEEDS with regard to prototyping needs**

Schedule

❑ Identify preliminary list of NewDISS technology drivers	11/06/01
❑ ESTO Technology Workshop draft technology needs	01/09/02 05/01/02
❑ SEEDS Capabilities Vision workshop draft vision	06/17/02 09/01/02
❑ Develop draft technology plans	07/01/02
❑ Identify draft approach to SEEDS technology infusion	09/01/02
❑ Technology Development and Infusion Plan	12/30/02

Approach

- **Leverage ESTO AIST processes**
  - ➢ Evaluate the ESTO AIST strategic planning process to assess applicability to SEEDS to support technology needs and investments

- **Articulate a SEEDS technology planning process**

- **Create SEEDS capabilities vision via community input**
  - ➢ Identify SEEDS scenarios for 2010+ to characterize needed capabilities
  - ➢ Results drive technology needs database

- **Work with Standards & Interfaces for Future ESE Missions study group to develop SEEDS technology infusion plan**
  - ➢ Research "best practices"
  - ➢ Investigate procurement options

Status

- ❑ Held AIST Workshop Jan. 9-10, 2002 and currently finalizing inputs

- ❑ SEEDS vision discussion at ESIP meeting May 14

- ❑ SEEDS Public Workshop vision discussion June 17

Technology Infusion Process Definition

- ❑ **Goals of the process**
  - ➢ Provide technical capabilities needed to meet the ESE science and application goals
    - ▪ Enable effective use of earth science data and information for research and applications
    - ▪ Enable easy exchange of Earth science data and information among diverse distributed systems

- ❑ **Principles**
  - ➢ Consensus/cooperation/community-centric
  - ➢ Open solutions to accelerate technology infusion

- ❑ **Just starting process definition**
  - ➢ Several informal interviews conducted
  - ➢ Examined model processes including OGC Interoperability Program
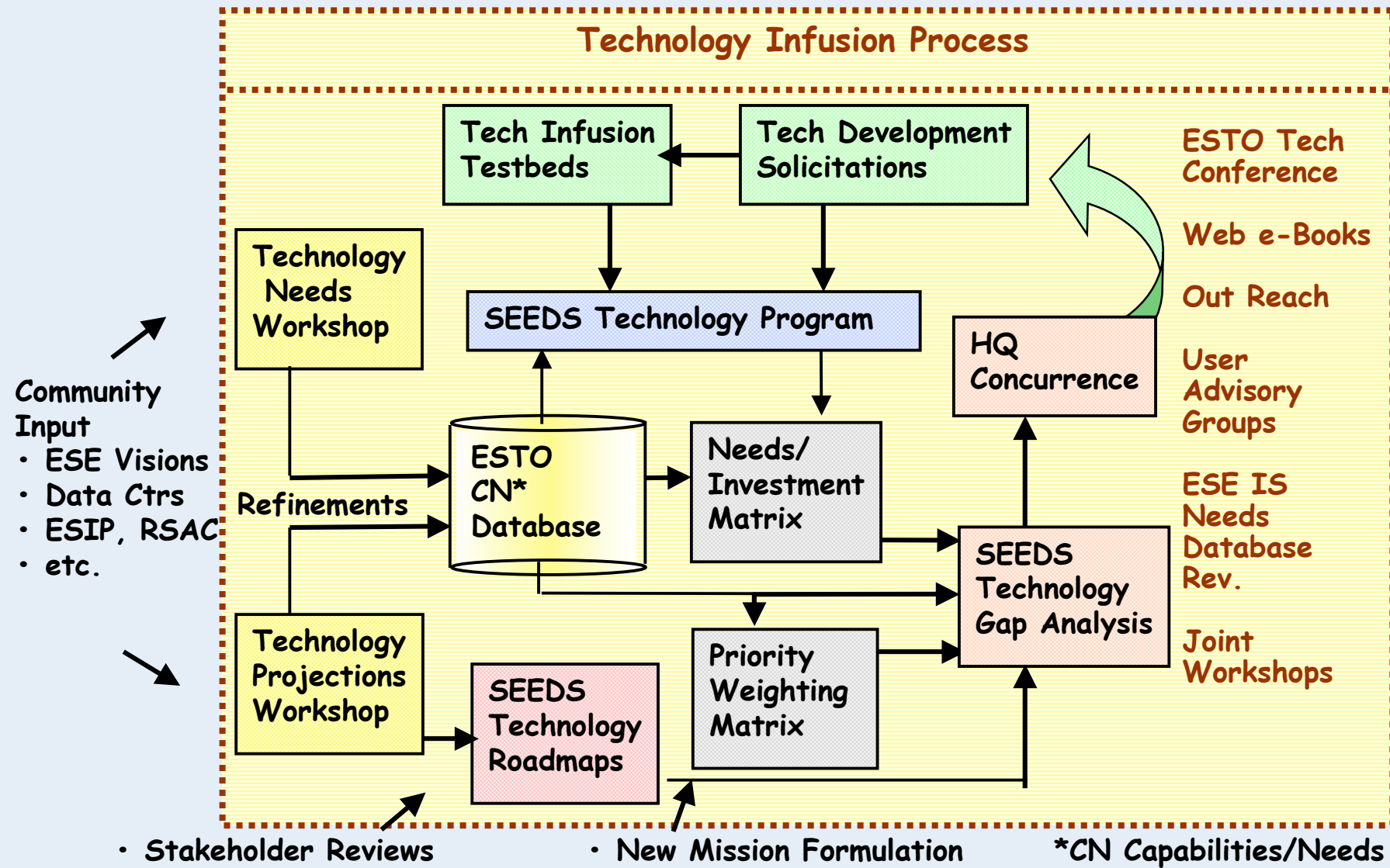 - ➢ Looking for more input at this workshop

- ❑ **Highlights of tech infusion process issues**
  - ➢ Intellectual property rights raises numerous barriers to technology infusion
  - ➢ Applications developers may be less tolerant of hard-to-integrate technologies
    - ▪ Too much effort may mean the business is not sustainable
  - ➢ User acceptance of technology depends on user understanding of its benefits
    - ▪ Infusion is not primarily a technical issue
  - ➢ Introduction of some computing technologies is easier now (e.g., Linux clusters)
  - ➢ Tech infusion must recognize trend toward dominant commercial products for core functions (e.g., Oracle for DBMS, ESRI for GIS)

SEEDS Formulation

ESE Technology Planning Process

□ **Goal is to extend/adapt current process for SEEDS**

SEEDS Formulation

Technology Infusion Process

Tech Infusion Testbeds

Tech Development Solicitations

Technology Needs Workshop

SEEDS Technology Program

HQ Concurrence

ESTO Tech Conference

Web e-Books

Out Reach

User Advisory Groups

Community Input
- ESE Visions
- Data Ctrs
- ESIP, RSAC
- etc.

Refinements

ESTO CN* Database

Needs/ Investment Matrix

SEEDS Technology Gap Analysis

ESE IS Needs Database Rev.

Technology Projections Workshop

SEEDS Technology Roadmaps

Priority Weighting Matrix

Joint Workshops

• **Stakeholder Reviews**   • **New Mission Formulation**   *****CN Capabilities/Needs**

Technology Infusion Process Definition

- ❑ **Key elements**
  - ➢ Collaborative evaluation process (ground rules and methodology)
  - ➢ Gap identification/prioritization (identify targets for tech infusion)
  - ➢ Procedures for conducting technology infusion initiatives (OGC model)
  - ➢ Review and management process

- ❑ **Need detailed process for each tech infusion initiative**
  - ➢ Assessment
    - ◼ Identify what problem to tackle (= Vision – current state)
    - ◼ Identify potential solutions (possibly competing solutions)
  - ➢ Concept
    - ◼ Define approach, how to evaluate technology solution(s)
  - ➢ Architecture/infrastructure
    - ◼ Identify team, systems, components, test data, …
  - ➢ Development
    - ◼ Create, modify, integrate components
  - ➢ Execution
    - ◼ Test, experiment, measure, recurse
  - ➢ Profit
    - ◼ Document, report, distribute, promulgate

Capability Needs Identification

- ❑ **Builds on current ESE tech planning process and needs database**
  - ➤ See esto.nasa.gov → Documentation → Capability & Needs for SAT → AIST

- ❑ **Workshops and individual interviews conducted to identify capability needs**
  - ➤ Looking for more input at this workshop
  - ➤ Study team will assemble input into a straw vision

- ❑ **Highlights of needed capabilities identified so far**
  - ➤ <u>Near-real-time data delivery</u> to support apps related to weather, disaster relief, etc.
  - ➤ <u>Web self-throttling capabilities</u> to handle a broader user population with more data processing capability (HW & SW)
  - ➤ <u>Content-based search</u> mechanisms to reduce dependency on manually-created metadata
  - ➤ Mechanisms to show <u>data lineage</u> to trusted data sources and transformations applied along the way
  - ➤ Easier <u>data fusion</u> to enable more complex models, more interdisciplinary science, and diverse applications
  - ➤ <u>Flexible toolkits</u> that can adapt to changing user needs
  - ➤ Better support (e.g., <u>plug-ins</u>) for commercial application packages like ArcInfo, IDL
  - ➤ <u>Tools</u> to enable chains of value-added services (e.g., aggregation servers) to fulfill application needs

SEEDS Capability Vision

❑ **Important part of the capability needs identification process**

  ➢ Defines the target we are trying to hit

  ➢ Highlights gaps that exist and barriers to reaching the science and application goals

  ➢ Provides guidance for technology infusion efforts

❑ **Key characteristics**

  ➢ Focused on ESE data systems for science data processing

  ➢ Supports the ESE vision for science and applications

  ➢ Represents the view of the ESE community

❑ **Related visions**

  ➢ ESE Research Vision

  ➢ ESE Applications Strategic Plan

  ➢ NASA's Vision of the Future (IGARSS video)

- ❑ **Technology infusion process definition**
  - ➢ Gather community input on process
    - ▪ Review and dissemination of input from first SEEDS public workshop, ESIP SEEDS meeting
    - ▪ Second SEEDS public workshop (you are here!)
  - ➢ Identify technology infusion strategies and model processes
  - ➢ Identify needed extensions to current AIST process
  - ➢ Document process in a SEEDS Technology Development & Infusion Plan
- ❑ **Capability needs identification**
  - ➢ Initiate development of a SEEDS capability vision
    - ▪ Second SEEDS public workshop (you are here!)
    - ▪ One-on-one Interviews (in progress)
    - ▪ ESIP Federation Cluster (ongoing?)
    - ▪ AIST capabilities/needs workshop (future?)
  - ➢ Define vision document structure & content
  - ➢ Synthesize community input into a capability vision document

Technology Infusion & Capability Vision Workshop

- ❑ **Logistics**
  - ➢ Today @ 1:00
  - ➢ Breakout rooms 1 & 2

- ❑ **Goal**
  - ➢ Begin to define a capability vision for ESE data systems in the SEEDS era
  - ➢ Capture your thoughts and recommendations

- ❑ **Topics**
  - ➢ SEEDS Capability Vision
    - ▪ Needed capabilities
    - ▪ Barriers that hinder current work
    - ▪ Relevant prototypes
    - ▪ Technology trends and changes in data usage
  - ➢ Technology infusion process

- ❑ **Recommended attendees**
  - ➢ Mission data providers
  - ➢ Application service/data providers
  - ➢ Science data users

- ❑ **Lunch exercise**
  - ➢ Imagine the capabilities of future ESE data systems
  - ➢ Bring your ideas to the workshop!